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INSTRUCTION MANUAL

The Marka-Sweep

Model VIDEO

KAY ELECTRIC COMPANY

14 Maple Ave., Pine Brook, N. J.

4205

Manual
of
INSTRUCTIONS
for the
MARKA-SWEEP Model Video

Manufactured by
KAY ELECTRIC COMPANY
23 Maple Ave. Pine Brook, N. J.

Section I: Description

The Model Video is a wide-band sweeping oscillator designed for use with an oscilloscope in defining the bandpass characteristics of video amplifiers. It provides the choice of a frequency sweep from 50 kilocycles to 10 megacycles or a frequency sweep from 50 kilocycles to 20 megacycles. The Model Video develops marker pips which are independent of the amplifier circuits under test.

Section II: Features

The Model Video produces a linearly swept signal from 50 kc. to 10 mc. or from 50 kc. to 20 mc. The sweep system is all electronic with the swept oscillator being frequency-modulated by varying the permeability of the core of the coil. The sweep signal is a symmetrical sawtooth, the negative going time interval being utilized to disable the sweeping oscillator and produce a bright zero level baseline on the oscilloscope display.

All markers are crystal-positioned and of the pulse type, being fed directly to the vertical terminals of the oscilloscope. Markers of this type are completely independent of the circuit under test, and neither cause overloading during alignment nor disappear in regions of low amplification. The mark level is adjusted by an independent control, which allows setting convenient mark heights regardless of the level of the frequency response display.

The Model Video is carefully isolated from its own electronic regulated power supply as well as from the power line source. A shield box completely encloses the RF unit, independent of the cabinet.

Section III: General Circuit Description

The basic circuits of the Marka-Sweep Model Video (Schematic Diagram, Fig. 1) are shown in simplified block diagram in Fig. 2. In addition to a regulated power supply, they are comprised of:

1. Sawtooth generator
2. 60 to 70 and 60 to 80 mc. sweeping oscillator
3. Broadband buffer or isolation amplifier
4. 60 mc. crystal oscillator
5. 60 mc. isolation amplifier
6. Mixer
7. Low pass filter 0 to 20 mc.
8. Variable attenuator

9. Crystal filters

10. Detector

11. Trigger amplifier

12. Pip generator

The 60 to 70 and 60 to 80 mc. sweeping oscillator employs a 12AT7 (V3) and utilizes a variable permeability technique. The oscillator is frequency-modulated by an amplified sawtooth voltage generated in a 6J6 (V1) multivibrator circuit. This sawtooth voltage is used not only to develop the frequency sweep but also to provide time base voltage for the horizontal axis of the oscilloscope. Thus, by connecting the horizontal axis amplifier of the oscilloscope to the SWEEP OUT terminals of the Model Video, all phasing difficulties are avoided. The sweep rate can be locked to the 60 cycle line frequency rate. Or if hum pickup is suspected in the amplifier under test the sweep rate can be varied slightly.

A 60 mc. crystal oscillator consisting of a cathode coupled 12AT7 (V6) is provided as the local oscillator against which the 60 to 70 and 60 to 80 mc. sweeping oscillator beats. Each of these individual oscillators is decoupled through individual 6AH6 buffer amplifiers (V8 and V9). Such amplifiers minimize the lock-in frequency and maintain the low frequency output down to 50 kc.

A 12AT7 mixer (V10) produces the desired heterodyned output from 50 kc. to 10 mc. and 50 kc. to 20 mc. A low pass filter, 0 to 20 mc., serves to attenuate the 60 to 80 mc. output which would otherwise also be present. A double potentiometer continuously variable attenuator and also 20 db, 20 db and 10 db step attenuators are provided.

In developing the marker "pips", signals from the 60 to 80 mc. sweeping oscillator are fed into crystal filters cut to 61, 82, 65, 70, 75 and 80 mc. These crystal filters thus produce pips at an output frequency of 1, 2, 5, 10, 15 and 20 mc.

The trigger voltage from the crystal filters is amplified and used to trigger the pip generator, V8.

Section IV: Description of Controls

A. Panel Controls and Connectors

1. ON-OFF Toggle Switch (S11) is the power switch in the primary of the power transformer.

2. Pilot Light (I1) is lighted when power is on.

3. Sweep Selector (s1) is the rotary switch with two positions which is used to select either the 50 kc. to 10 mc. or the 50 kc. to 20 mc. sweep width. Additional segments of this switch also reposition the sweep centering and adjust the trigger level for proper pip operation.

4. CENTERING is a potentiometer control (R15) which establishes the zero beat condition on the left edge of the visual sweep display.

5. SWEEP OUT terminals J1 make available the sawtooth sweeping voltage for connection to the horizontal terminals of the test oscilloscope.

6. SWEEP RATE control (R2) allows variation of the repetition rate of the sawtooth around 60 cycles. A 60 cycle synchronizing voltage allows easy synchronization of the sweep rate with the power line to make a stable picture possible in spite of hum in the system under test. Asynchronous operation allows simple detection of such hum.

7. PIP OUTPUT terminals make available the pulse type marker signals for connection directly to the vertical terminals of the test oscilloscope.

8. PIP INCREASE control allows adjustment of the voltage level of the marker pips between zero and approximately 50 volts peak (positive).

9. EXT OSC INPUT is a coaxial connector into which any source of 0.1 volt 60 mc. to 80 mc. energy may be fed to give a traveling pip.

10. SWEEPING OSCILLATOR OUTPUT (J2) is the output terminal of the sawtooth swept RF. A maximum voltage of approximately 0.5 volt RMS at a 70 ohms output impedance level. This signal may be reduced by:

11. Switched Attenuators 20 db, 20 db, 10 db and,

12. Continuous attenuator, a double potentiometer, R78 A & B, which will reduce the voltage by another db approximately.

B. Chassis Controls

1. Marker adjustment potentiometers (R38, R39) which are reached through two holes on the right hand side of the cabinet (looking from the front). These potentiometers adjust the input trigger to the pip-forming multivibrator. If these controls are set too far counterclockwise, no pips may be seen. If set too far clockwise, then distorted or multiple-firing pips may be seen. The controls should be set midway in the range of operation on 0-20 mc. sweep with the potentiometer nearest the front panel and on the 0-10 mc. sweep with the potentiometer farthest from the front panel.

2. Sweep Width Control is found on the left hand side of the cabinet, again by screwdriver adjustment. If the sweep width is changed it may be necessary to readjust

53
90 70 R95E
62

the trigger level adjustments described above.

Section V: Operating Instructions

A. Plug the power cord into a source of 105-125 volt AC at 50-60 cycles. Turn the Model Video on and allow 10 to 15 minutes for stabilization.

B. Make cable connections as follows (note Figs. 3,4):

1. Connect 70 ohm output cable (with BNC connectors) between SWEEPING OSCILLATOR OUTPUT terminal and video amplifier under test. It is usually good test practice to terminate this cable in 70 ohms.

2. Connect SWEEP OUT terminals to the horizontal amplifier terminals of oscilloscope. Either shielded or unshielded lead may be used.

3. Connect PIP OUTPUT terminals to vertical amplifier terminals of oscilloscope. Shielded lead is recommended. It is often advisable to connect a 10,000 ohm resistor in series with this lead right at the oscilloscope. The need for the isolation can be determined later by observing the effect on the displayed response of connecting and disconnecting this pip output lead. Change in shape of response curve indicates the desirability of isolation, whereas mere change in level is unimportant.

4. Output of video amplifier must be detected usually before mixing with pip output at vertical amplifier terminals of oscilloscope. See Fig. 4. The only time that such detection is unnecessary is when the oscilloscope vertical amplifier has a pass band wider than that of the video amplifier under test. See Fig. 3.

Note that such a wide variety of output impedances and gain variations is found in typical video amplifiers that it is not possible to consider all possible test setups. Thus Fig. 3 is merely a guide. Sometimes it may be necessary to terminate the video amplifier and also compensate for the input capacitance of the oscilloscope which is used.

C. Operation

1. After connection as described, adjust attenuator controls and gain of vertical axis amplifier of oscilloscope until response curve is obtained on oscilloscope.

2. Adjust SWEEP RATE control until oscilloscope pattern is stationary.

3. Adjust PIP OUTPUT control until pips are of convenient height.

4. Select desired CRYSTAL MARKERS by means of toggle switches 1 to 6. As set up in the standard Model Video unit the following frequencies will be found:

CRYSTAL MARKER	FREQUENCY PIP
1	1 mc.
2	2 mc.
3	5 mc.
4	10 mc.
5	15 mc.
6	20 mc.

Other special crystals may be substituted in any of the above positions.

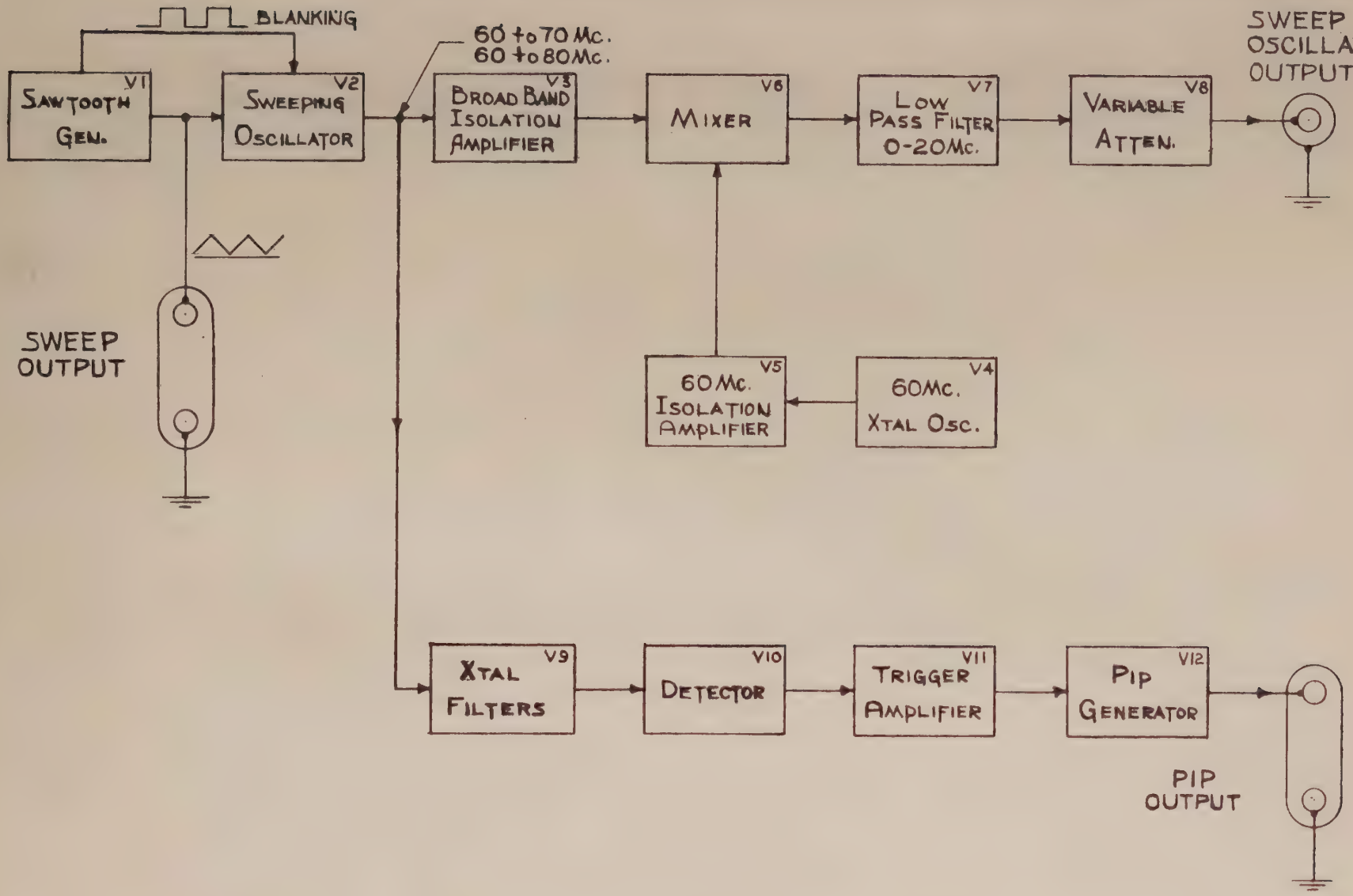


FIG. 1 - BLOCK DIAGRAM OF THE MODEL VIDEO

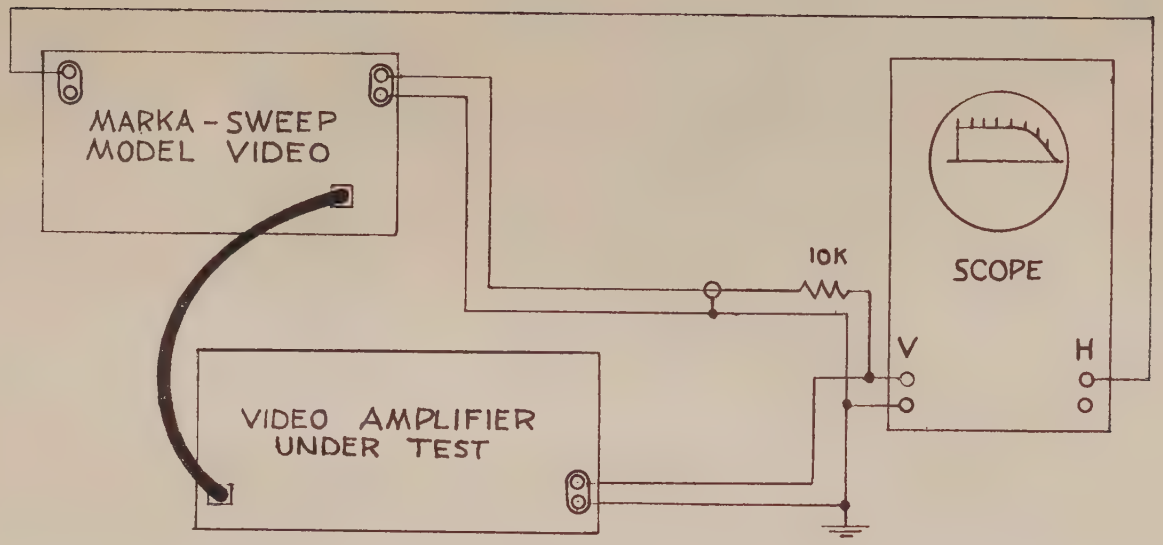

MARKA - SWEEP
MODEL VIDEO
VIDEO AMPLIFIER
UNDER TEST
10K
SCOPE
V
H

FIG. 3

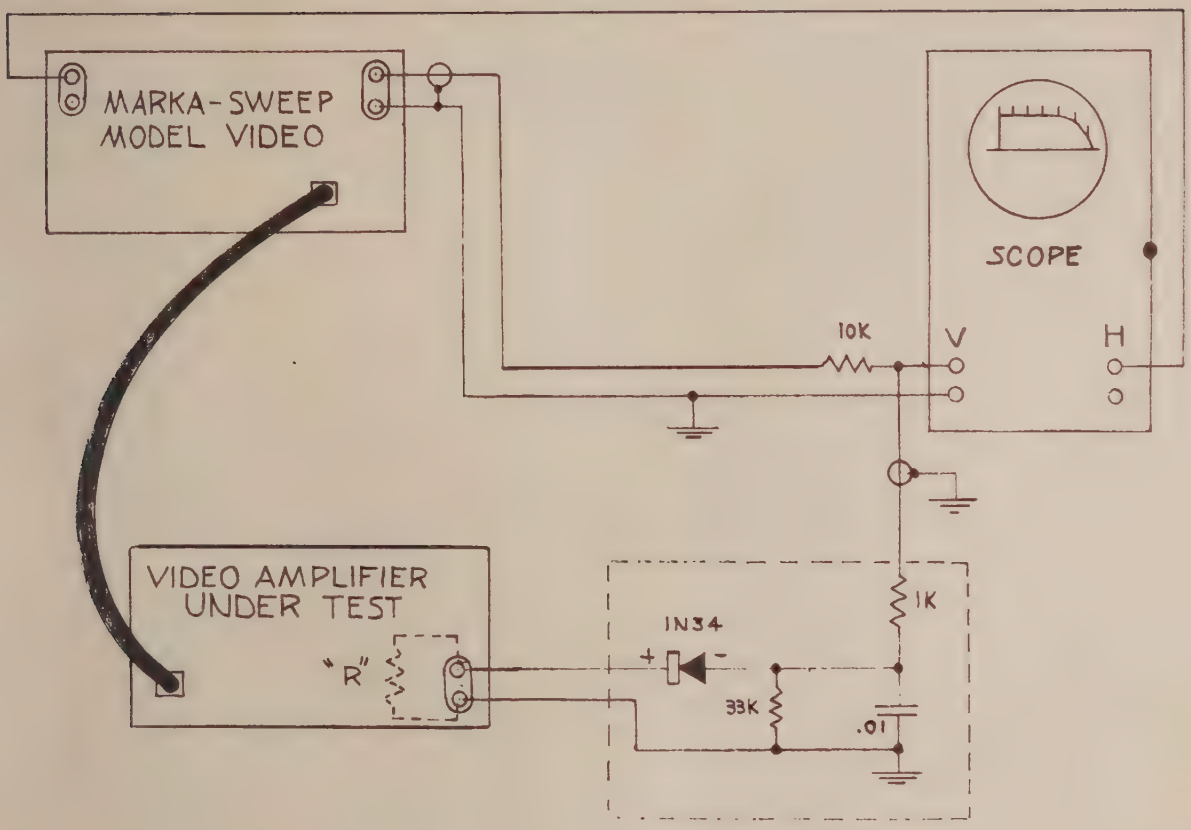


FIG. 4

Suggested type of detector for use when bandwidth of vertical amplifier of oscilloscope is narrower than bandwidth of video amplifier under test. "R" should be added to present load impedance for which video amplifier was designed.

MODEL VIDEO
PARTS LIST

Tubes

V1	6J6
V2	6V6
V3	12AT7
V4	12AU7
V5	12AU7
V6	12AT7
V7	6AH6
V8	12AT7
V9	6AH6

Resistors

R1	470K
R2	100K
R3	3.3M
R4	100K
R5	100K
R6	220K
R7	3.3M
R8	3.3M
R9	150K
R10	150K
R11	1.2M
R12	470K
R13	500K Sweep Amplitude (Internal)
R14	470K
R15	10K Centering
R16	3.3M
R17	3.3M
R18	200 ohms
R19	150 ohms
R20	33K 1 watt
R21	1K
R22	270K
R23	2.2K
R24	10K
R25	10K
R26	82K
R27	3.9K
R28	100K
R29	100K
R30	220 ohms
R31	100K
R32	470 ohms
R33	470 ohms
R34	100K
R35	220 ohms
R36	220 ohms
R37	100K
R38	500K Trigger Adj. (Internal)
R39	500K Trigger Adj. (Internal)
R40	470 ohms
R41	470 ohms
R42	100K
R43	220 ohms
R44	100K
R45	100K
R46	22K
R47	22K
R48	470 ohms
R49	4.7K 1 watt
R50	100 ohms
R51	10K
R52	10 ohms
R53	180 ohms
R54	180 ohms
R55	10 ohms
R56	10 ohms
R57	150 ohms
R58	33K 1 watt
R59	4.7K 2 watt
R60	100K
R61	15K
R62	200K
R63	39K
R64	56K 1 watt
R65	100K Pip Output
R66	47K
R67	82 ohms
R68	330 ohms
R69	82 ohms
R70	82 ohms
R71	330 ohms
R72	82 ohms
R73	130 ohms
R74	100 ohms
R75	130 ohms
R76	91 ohms
R77	91 ohms
R78A	500) Pip Increase
R78B	250)
R79	3.3K 1 watt

Resistors (continued)

R80	3.3K	1 watt
R81	4.7K	2 watts
R82	2.4K	1 watt
R83	33K	1 watt
R84	100 ohms	
R85	4.7K	2 watts
R86	1.5K	
R87	1 meg	
R88	220K	

Capacitors

C1	1250 mmf	
C2	1250 mmf	
C3	.01 mf	
C4	.02 mf	
C5	.01 mf	
C6	.25 mf	
C7	.1 mf	
C8	20 mf	electrolytic - 450 V
C9	1 to 7 mmf)	Variable Patter
C10	1 to 7 mmf)	
C11	2 mmf	
C12	2 mmf	
C13	2 mmf	
C14	2 mmf	
C15	2 mmf	
C16	2 mmf	
C17	10 mmf	
C18	10 mmf	
C19	1000 mmf	
C20	.25 mf	
C21	1000 mmf	
C22	91 mmf	
C23	1000 mmf	
C24	.25 mmf	- electrolytic - 450 V
C25	.25 mmf	- electrolytic - 450 V
C26	1000 mmf	
C27	2000 mmf	
C28	390 mmf	
C29	1000 mmf	
C30	.25 mf	- electrolytic - 450 V
C31	.25 mf	- electrolytic - 450 V
C32	1000 mmf	
C33	1000 mmf	
C34	1000 mmf	
C35	.01 mf	
C36	1000 mmf	
C37	100 mmf	
C38	3 mmf	
C39	.01 mf	
C40	.01 mf	
C41	.01 mf	
C42	390 mmf	
C43	33 mmf	
C44	390 mmf	
C45	.02 mf	
C46	7 to 45 mmf - variable patter	
C47	.05 mf	
C48	.01 mf	
C49	100 mmf	
C50	100 mmf	
C51	240 mmf	
C52	.01 mf	
C53	.01 mf	
C54	.01 mf	
C55	.01 mf	
C56	400 mmf	
C57	400 mmf	
C58	400 mmf	
C59	400 mmf	
C60	91 mmf	

MODEL VIDEO
PARTS LIST

D1	1N34	Crystal Detector	
D2	1N34	Crystal Detector	
D3	1N34	Crystal Detector	
D4	1N34	Crystal Detector	
D5	1N34	Crystal Detector	
D6	1N34	Crystal Detector	
Chokes			
L1, L2		10 henry	150 ohms 75 M. A.
Coils			
L3,4,5,6		Special coils	
Switches			
S1		S.P.S.T.	ON-OFF
S2		D.P.D.T.	METER READING
Pilot Light			
I1		#47 or #44	Bayonet Type
Fuse			
F1		3 amp.	3 AG
Plug			
P-406		CCT	
T-1		Special Transformer	
T-2		Special Transformer	
T-3		Special Transformer	

MODEL VIDEO POWER SUPPLY PARTS LIST

Tubes

V1	5R4	V4	6S17 or 6SU7
V2	6Y6	V5	6SN7
V3	6Y6	V6	VR150

Resistors

R1	330K	1/2 watt	R9	100	1 watt
R2A, R2B	51	1 "	R10	270K	1/2 "
R3	390	1/2 "	R11	82K	1 "
R4	120K	1/2 "	R12	10K	1 "
R5	220	1/2 "	R13	2700	1/2 "
R6	100	1 "	R14	120K	1/2 "
R7	220	1/2 "	R15	82K	1/2 "
R8	390	1/2 "	R16	82K	1/2 "

Condensors

C1	2mf.	600 V.	C6	.5mf.	600 V.
C2	2mf.	600 V.	C7	40mf.	450 V.
C3	2mf.	600 V.	C8	.01mf.	500 V.
C4	4mf.	600 V.	C9	.5mf	600 V.
C5	2mf.	600 V.			

Potentiometers

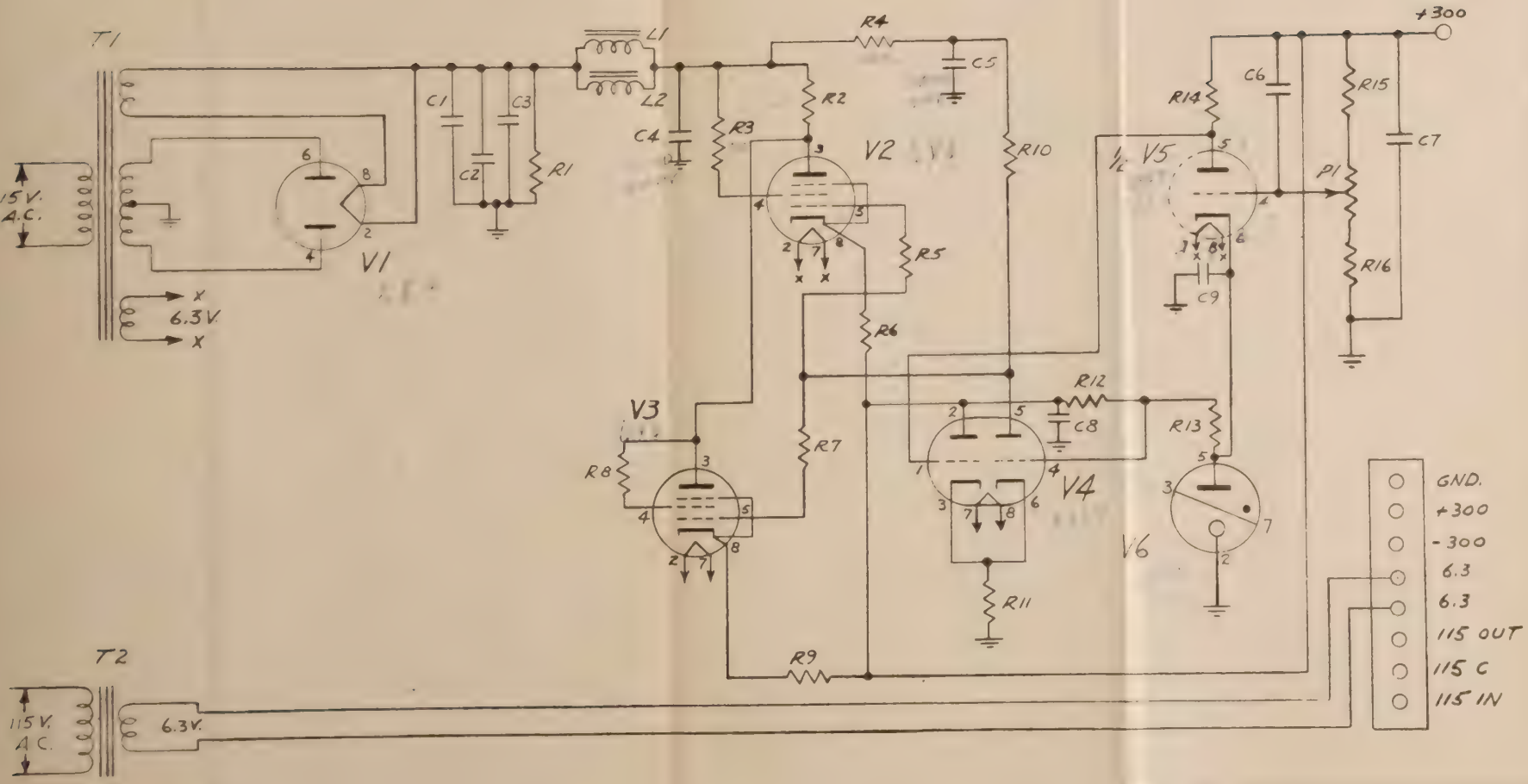
P1	25K	2 watts	Type J

Transformers

T1	KP91	Industrial
T2	KP65	Industrial

Chokes

L1	10 Henry	270 ohms	.1 Ampere
L2	10 Henry	270 ohms	.1 Ampere



POWER SUPPLY
#123

KAY ELECTRIC CO. PINE BROOK, N. J.

MARKA-SWEEP MODEL VIDEO SCHEMATIC DIAGRAM

KAY ELECTRIC CO., PINE BROOK, N.J.

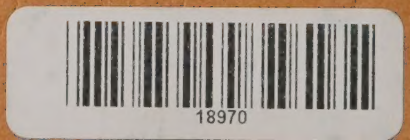
DWG NO. 2CG2-E

FIG. #2

NOTE

ALL RESISTANCE VALUES IN OHMS; K=1000, M=1,000,000, ½ WATT SIZES.
" CAPACITORS " " MICROMICROFARADS, UNLESS OTHERWISE SPECIFIED.

59.975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